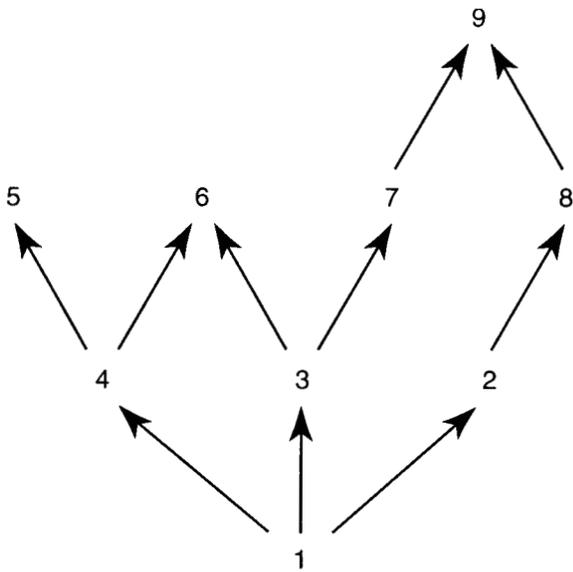




**High School Test  
in  
Science**

*Released Items  
Spring 2001*

3



The diagram above shows a food web. Each number represents an organism in the food web. Which of these organisms can transform light energy into chemical energy?

- A organism 1
- B organism 3
- C organism 6
- D organism 9

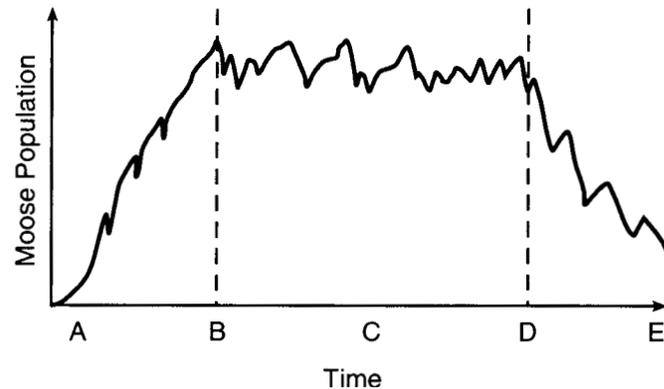
4 Because they are rapidly being cut down, the rain forests today are endangered ecosystems. How might widespread destruction of the rain forests affect other ecosystems in the world?

- A by increasing the amount of available soil
- B by reducing the amount of available oxygen
- C by increasing the diversity of plant and animal life
- D by reducing the amount of available carbon dioxide

Use the following information to answer questions 11 through 14.

Isle Royale is an island situated in Michigan's Lake Superior. The ecosystem of this island supports a population of wolves as well as a population of moose. For many years, scientists have studied the predator-prey relationship between wolves and moose on the island.

The graph below shows changes in the moose population on Isle Royale over a period of time.



- 11 Which of these procedures could be used to test the hypothesis that an increase in the wolf population will cause a decrease in the moose population on Isle Royale?
- A Remove some of the wolves from Isle Royale.
  - B Remove some of the moose from Isle Royale.
  - C Place ten wolves and ten moose in an enclosure and observe for several months.
  - D Introduce more wolves onto Isle Royale.
- 12 Which of the following natural forces was the **LEAST** likely cause of the decrease in the island's moose population during the time period from D to E?
- A disease
  - B mutation
  - C predation
  - D competition

- 13 During the time period from B to D, which of the following events probably occurred?
- A The moose population reached the carrying capacity of the island.
  - B A major fire destroyed the moose population's food supply.
  - C A serious disease swept through the moose population.
  - D The moose in the population stopped reproducing.

14 **2 Points**

The data below represent the numbers of wolves and moose living together in an ecosystem over a period of 30 years.

| YEAR | MOOSE | WOLVES |
|------|-------|--------|
| 1975 | 1,459 | 36     |
| 1985 | 2,054 | 14     |
| 1995 | 1,836 | 27     |
| 2005 | 1,935 | 12     |

Why is the prediction in the table regarding the number of moose and wolves that will be in the ecosystem in 2005 only a very rough estimate? Discuss two factors that limit the reliability of such a prediction.

Read the following investigation carefully and use the information to answer questions 15 and 16.

### INVESTIGATION

**Problem** How does the color of light affect plant growth?

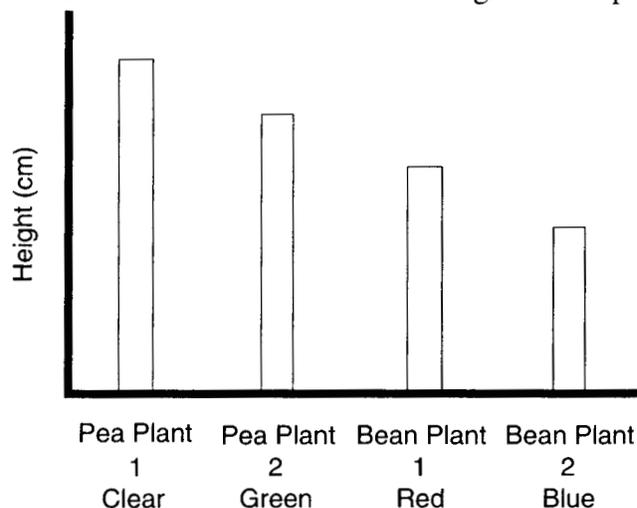
**Hypothesis** Plants will grow better under clear cellophane than under green, red, or blue cellophane.

**Materials**

- 4 pots, with 4 inches of soil in each
- 1 sheet of red cellophane
- 1 sheet of blue cellophane
- 1 sheet of green cellophane
- 1 sheet of clear cellophane
- 2 bean plants
- 2 pea plants
- 1 metric ruler
- water

**Procedure** Each plant is placed randomly under one of the sheets of cellophane such that sunlight reaching the plants must pass through the cellophane. The cellophane-covered plants are placed on different window sills and allowed to grow for two weeks. At the end of that time the heights of the plants are measured with a ruler.

### Results



**Conclusion** Plants grow better when exposed to white light than when exposed to green, red, or blue light.

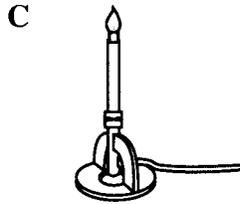
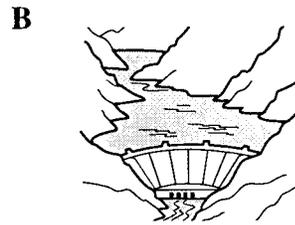
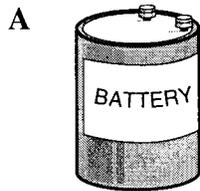
**15 2 Points**

Identify three weaknesses in the procedure used for this investigation.

**16 2 Points**

Describe how you would correct each of the three weaknesses you identified in item 15.

18 Which of these can convert electrical energy to mechanical energy?



20 The table below shows the distance traveled and time elapsed for each object as it moves from points A to B and from B to C.

| Object | From A to B |       | From B to C |       |
|--------|-------------|-------|-------------|-------|
|        | Distance    | Time  | Distance    | Time  |
| 1      | 2.6 m       | 2.0 s | 1.3 m       | 1.0 s |
| 2      | 1.8 m       | 1.2 s | 3.6 m       | 1.2 s |
| 3      | 4.0 m       | 5.5 s | 3.0 m       | 4.0 s |
| 4      | 5.0 m       | 5.0 s | 4.5 m       | 3.5 s |

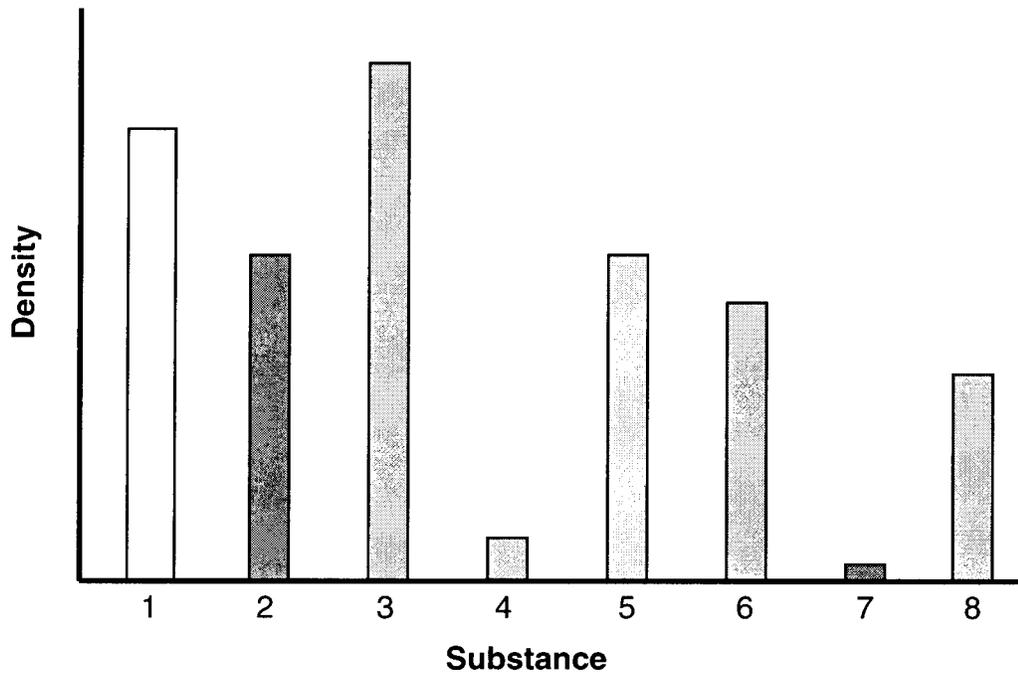
|             |
|-------------|
| <b>Key</b>  |
| m = meters  |
| s = seconds |

Objects 1, 2, 3, and 4 are moving in straight lines from point A to point B and then from point B to point C. **THE POSITIONS OF A, B, AND C ARE DIFFERENT FOR EACH OBJECT.**

Which object traveled at the same speed from point A to B as it did from B to C?

- A Object 1
- B Object 2
- C Object 3
- D Object 4

Study the following graph and use it to answer questions 27 through 30.



- 27 If substance 6 is water, which of these substances could float on water?
- A substance 1
  - B substance 3
  - C substance 5
  - D substance 8
- 28 Which substances have the same density?
- A substances 2 and 6
  - B substances 4 and 7
  - C substances 2 and 5
  - D substances 5 and 6

**29** Our everyday life has been improved by the development of low-density, high-strength materials. These materials are useful for all of the following **EXCEPT**

- A car parts.
- B life jackets.
- C boat anchors.
- D bicycle frames.

**30 2 Points**

An iron bar will sink when placed in water, but an iron ship will float. Explain why this is so. In your response, be sure to include the concepts of *density* and *volume*.

Read the following article carefully and use it to answer questions 31 and 32.

### WEIGHT TRAINING AND YOUNG PEOPLE

Twenty-five years ago it was generally believed that lifting weights did not help young people to gain strength. Most people thought that muscles increased in strength only because of normal growth processes.

Recently, a research study brought this belief into question. Fifteen subjects were observed over a period of eight months. All of them were 14 years of age. They trained three days per week, performing eight upper- and lower-body exercises on weight-training machines.

The results were clear: the exercisers showed a 63 percent increase in lower-body strength and a 33 percent increase in upper-body strength. In addition, each gained four pounds of lean weight, losing one pound of fat. There can be no doubt that youthful exercise increases muscle size and strength.

#### 31 2 Points

According to the article, what is the cause of the changes in the exercisers? Could other factors account for the results? In your response, be sure to give two alternative explanations that could account for the increase in muscle size and strength.

#### 32 2 Points

What is an important weakness in the scientific procedure of the study reported here? How would you correct the weakness that you identified in item 31?

- 34** The greenhouse effect presents some concern to humans but it is also an important part of Earth's ecosystem. Why is this?
- A** It makes Earth habitable by cooling its atmosphere.
  - B** It makes Earth habitable by warming its atmosphere.
  - C** It helps screen out harmful radiation from the sun.
  - D** It prevents carbon dioxide from escaping Earth's atmosphere.
- 39** Which of the following life-supporting conditions found on Earth is also present on the surface of Venus?
1. temperatures from  $-40^{\circ}\text{F}$  ( $-40^{\circ}\text{C}$ ) to  $+120^{\circ}\text{F}$  ( $+49^{\circ}\text{C}$ )
  2. an oxygen-rich atmosphere
  3. the availability of liquid water
  4. a solid surface
- A** 1                      **B** 2  
**C** 3                      **D** 4

**Michigan Educational Assessment Program  
Statewide Test Item Analysis  
HST in Science  
Grade 11 1st-Time Testers  
Spring 2001**

**District: PUBLIC SCHOOL  
Run Date: 08/09/2001**

| Multiple Choice   |                |                               |     |     |     |     | Constructed Response                                       |          |                |                                    |     |     |     |     |     |     | Percent Receiving Condition Codes |   |   |                                   |   |   |   |
|---|----------------|-------------------------------|-----|-----|-----|-----|--|----------|----------------|------------------------------------|-----|-----|-----|-----|-----|-----|-----------------------------------|---|---|-----------------------------------|---|---|---|
| Item No.  | Objective Code | Percent Answering by Response |     |     |     |     | Omit/Mult  | Item No. | Objective Code | Percent Receiving Number of Points |     |     |     |     |     |     |                                   |   |   | Percent Receiving Condition Codes |   |   |   |
|   |                | A                             | B   | C   | D   | 0.0 |  |          |                | 0.5                                | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 3.5 | 4.0                               | A | B | C                                 | D |   |   |
| <b>Earth Science</b>  |                |                               |     |     |     |     | <b>Physical Science</b>                                    |          |                |                                    |     |     |     |     |     |     |                                   |   |   |                                   |   |   |   |
| 34  | EAW 11         | 7                             | 41* | 32  | 21  | 0*  | 30   | PME 17   | 36             | 11                                 | 36  | 8   | 4   |     |     |     |                                   |   |   | 1                                 | 0 | 0 | 4 |
| 39  | ES 08          | 17                            | 18  | 18  | 46* | 1   | <b>Constructing</b>  |          |                |                                    |     |     |     |     |     |     |                                   |   |   |                                   |   |   |   |
| <b>Life Science</b>   |                |                               |     |     |     |     | <b>Reflecting</b>  |          |                |                                    |     |     |     |     |     |     |                                   |   |   |                                   |   |   |   |
| 03  | LEC 14         | 58*                           | 17  | 5   | 20  | 0*  | 15   | C 15     | 6              | 2                                  | 37  | 13  | 40  |     |     |     |                                   |   |   | 1                                 | 0 | 0 | 2 |
| 04  | LEC 18         | 2                             | 83* | 9   | 6   | 0*  | 16   | C 15     | 6              | 2                                  | 30  | 16  | 42  |     |     |     |                                   |   |   | 1                                 | 0 | 0 | 3 |
| 12  | LEC 16         | 8                             | 67* | 10  | 14  | 0*  | <b>Condition Codes for the Constructed Response Items:</b> |          |                |                                    |     |     |     |     |     |     |                                   |   |   |                                   |   |   |   |
| 13  | LEC 15         | 65*                           | 3   | 7   | 24  | 0*  | A Off-topic  |          |                |                                    |     |     |     |     |     |     |                                   |   |   |                                   |   |   |   |
| <b>Physical Science</b>   |                |                               |     |     |     |     | B Illegible  |          |                |                                    |     |     |     |     |     |     |                                   |   |   |                                   |   |   |   |
| 18  | PME 21         | 26                            | 8   | 3   | 62* | 1   | C Written in language other than English                   |          |                |                                    |     |     |     |     |     |     |                                   |   |   |                                   |   |   |   |
| 20  | PMO 08         | 45*                           | 38  | 9   | 7   | 0*  | D Blank/refused to respond                                 |          |                |                                    |     |     |     |     |     |     |                                   |   |   |                                   |   |   |   |
| 27  | PME 17         | 13                            | 12  | 2   | 72* | 0*  |  |          |                |                                    |     |     |     |     |     |     |                                   |   |   |                                   |   |   |   |
| <b>Constructing</b>   |                |                               |     |     |     |     |  |          |                |                                    |     |     |     |     |     |     |                                   |   |   |                                   |   |   |   |
| 11  | C 14           | 15                            | 5   | 22  | 58* | 0*  |  |          |                |                                    |     |     |     |     |     |     |                                   |   |   |                                   |   |   |   |
| 28  | C 19           | 3                             | 2   | 92* | 3   | 0*  |  |          |                |                                    |     |     |     |     |     |     |                                   |   |   |                                   |   |   |   |
| <b>Reflecting</b>   |                |                               |     |     |     |     |  |          |                |                                    |     |     |     |     |     |     |                                   |   |   |                                   |   |   |   |
| 29  | R 09           | 8                             | 24  | 59* | 8   | 0*  |  |          |                |                                    |     |     |     |     |     |     |                                   |   |   |                                   |   |   |   |
| <b>Number Tested: 82149</b>   |                |                               |     |     |     |     |  |          |                |                                    |     |     |     |     |     |     |                                   |   |   |                                   |   |   |   |
| <p>The Objective Codes correspond to those used in the <i>Michigan Essential Goals and Objectives for Science Education</i> (August, 1991).</p> <p><b>Earth and Space Science</b></p> <p>EG = Using Scientific Knowledge - Geosphere<br/>                     EH = Using Scientific Knowledge - Hydrosphere<br/>                     EAW = Using Scientific Knowledge - Atmosphere and Weather<br/>                     ES = Using Scientific Knowledge - Solar System, Galaxy, and Universe</p> <p><b>Life Science</b></p> <p>LC = Using Scientific Knowledge - Cells<br/>                     LO = Using Scientific Knowledge - Organization of Living Things<br/>                     LH = Using Scientific Knowledge - Heredity<br/>                     LE = Using Scientific Knowledge - Evolution<br/>                     LEC = Using Scientific Knowledge - Ecosystems</p> <p><b>Physical Science</b></p> <p>PME = Using Scientific Knowledge - Matter and Energy<br/>                     PCM = Using Scientific Knowledge - Changes in Matter<br/>                     PMO = Using Scientific Knowledge - Motions of Objects<br/>                     PWV = Using Scientific Knowledge - Waves and Vibrations</p> <p>C = Constructing New Scientific Knowledge<br/>                     R = Reflecting on Scientific Knowledge</p> |                |                               |     |     |     |     |  |          |                |                                    |     |     |     |     |     |     |                                   |   |   |                                   |   |   |   |

Omit/Mult = Omits and Multiple Responses  
 \* Number of students present rounds to zero